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Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

1. (currently amended) A semiconductor device comprising:

a first converter configured to convert a first digital audio signal sampled with a predetermined audio sampling frequency for digital audio into a second digital audio signal sampled with a predetermined voice sampling frequency for voice signals;

a second converter configured to convert a first digital voice signal sampled with the predetermined voice sampling frequency into a second digital voice signal sampled with the predetermined audio sampling frequency;

a first digital ~~processor~~ processing circuit configured to perform a predetermined digital computation on the second digital audio signal sampled with the predetermined voice sampling frequency and a digital voice signal; and

a second digital ~~processor~~ processing circuit configured to perform the predetermined digital computation on the second digital voice signal sampled with the predetermined audio sampling frequency and the first digital audio signal sampled with the predetermined audio sampling frequency.

2. (original) The semiconductor device according to Claim 1, wherein the predetermined digital computation includes an addition, a subtraction, a rate setting of the addition, and a rate setting of the subtraction.

3. (currently amended) The semiconductor device according to Claim 1, wherein the first digital ~~processor~~ processing circuit performs a volume setting on a digital signal processed with the predetermined digital computation.

4. (currently amended) The semiconductor device according to Claim 1, wherein the

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first digital ~~processor~~ processing circuit performs a signal band limitation on a digital signal processed with the predetermined digital computation.

5. (original) The semiconductor device according to Claim 4, wherein the signal band limitation is pre-programmable.

6. (currently amended) The semiconductor device according to Claim 1, wherein the second digital ~~processor~~ processing circuit performs a volume setting on a digital signal processed with the predetermined digital computation.

7. (currently amended) The semiconductor device according to Claim 1, wherein the second digital ~~processor~~ processing circuit performs a signal band limitation on a digital signal processed with the predetermined digital computation.

8. (original) The semiconductor device according to Claim 7, wherein the signal band limitation is pre-programmable.

9. (currently amended) A mobile phone using a semiconductor device, comprising:
an input device configured to convert a voice into an analog voice signal;
a voice analog-to-digital converter configured to convert the analog voice signal output from said input device into a first digital voice signal;
a voice digital-to-analog converter configured to convert a second digital voice signal sampled with a predetermined voice sampling frequency for voice signals into an analog voice signal;
a voice output device configured to generate a voice sound in accordance with the analog voice signal output from said voice digital-to-analog converter;
an audio digital-to-analog converter configured to convert a digital audio signal sampled with a predetermined audio sampling frequency for audio signals into an analog audio signal;

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and

an audio output device configured to generate an audio sound in accordance with the analog audio signal output from said audio digital-to-analog converter,

wherein the semiconductor device is configured to process the digital voice signal, the digital voice signal sampled with the predetermined voice sampling frequency, and the digital audio signal sampled with the predetermined audio sampling frequency, and comprises:

a first converter configured to convert the digital audio signal into a first converted signal sampled with the predetermined voice sampling frequency;

a second converter configured to convert the digital voice signal into a second converted signal sampled with the predetermined audio sampling frequency;

a first digital ~~processor~~ processing circuit configured to perform a predetermined digital computation on the digital audio signal sampled with the predetermined voice sampling frequency and the first digital voice signal; and

a second digital ~~processor~~ processing circuit configured to perform the predetermined digital computation on the second digital voice signal sampled with the predetermined audio sampling frequency and the digital audio signal sampled with the predetermined audio sampling frequency.

10. (original) The mobile phone according to Claim 9, wherein the predetermined digital computation includes an addition, a subtraction, a rate setting of the addition, and a rate setting of the subtraction.

11. (currently amended) The mobile phone according to Claim 9, wherein the first digital ~~processor~~ processing circuit performs a volume setting on a digital signal processed with the predetermined digital computation.

12. (currently amended) The mobile phone according to Claim 9, wherein the first digital ~~processor~~ processing circuit performs a signal band limitation on a digital signal

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processed with the predetermined digital computation.

13. (original) The mobile phone according to Claim 12, wherein the signal band limitation is pre-programmable.

14. (currently amended) The mobile phone according to Claim 9, wherein the second digital ~~processor~~ processing circuit performs a volume setting on a digital signal processed with the predetermined digital computation.

15. (currently amended) The mobile phone according to Claim 9, wherein the second digital ~~processor~~ processing circuit performs a signal band limitation on a digital signal processed with the predetermined digital computation.

16. (original) The mobile phone according to Claim 15, wherein the signal band limitation is pre-programmable.

17. (currently amended) A mobile phone using a semiconductor device, comprising:
an input device configured to convert a voice into an analog voice signal;

a voice analog-to-digital converter configured to convert the analog voice signal output from said input device into a first digital voice signal;

a digital voice amplifier configured to amplify and output a second digital voice signal sampled with a predetermined voice sampling frequency for voice signals;

a voice output device configured to generate a voice sound in accordance with the second digital voice signal output from said digital voice amplifier;

a digital audio amplifier configured to amplify and output a digital audio signal sampled with a predetermined audio sampling frequency for an audio signal;

an audio output device configured to generate an audio sound in accordance with the digital audio signal output from said digital audio amplifier.

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wherein the semiconductor device is configured to process the first digital voice signal, the second digital voice signal sampled with the predetermined voice sampling frequency, and the digital audio signal sampled with the predetermined audio sampling frequency, and comprises:

a first converter configured to convert the digital audio signal into a signal sampled with the predetermined voice sampling frequency;

a second converter configured to convert the first digital voice signal into a signal sampled with the predetermined audio sampling frequency;

a first digital ~~processor~~ processing circuit configured to perform a predetermined digital computation on the digital audio signal sampled with the predetermined voice sampling frequency and the digital voice signal; and

a second digital ~~processor~~ processing circuit configured to perform the predetermined digital computation on the first digital voice signal sampled with the predetermined audio sampling frequency and the digital audio signal sampled with the predetermined audio sampling frequency.

18. (original) A semiconductor device comprising:

first converting means for converting a first digital audio signal sampled with a predetermined audio sampling frequency for digital audio into a second digital audio signal sampled with a predetermined voice sampling frequency for voice signals;

second converting means for converting a first digital voice signal sampled with the predetermined voice sampling frequency into a second digital voice signal sampled with the predetermined audio sampling frequency;

first digital processing means for performing a predetermined digital computation on the second digital audio signal sampled with the predetermined voice sampling frequency and a third digital voice signal; and

second digital processing means for performing the predetermined digital computation on the second digital voice signal sampled with the predetermined audio sampling frequency and

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the first digital audio signal sampled with the predetermined audio sampling frequency.

19. (original) The semiconductor device according to Claim 18, wherein the predetermined digital computation includes an addition, a subtraction, a rate setting of the addition, and a rate setting of the subtraction.

20. (original) The semiconductor device according to Claim 18, wherein the first digital processing means performs a volume setting on a digital signal processed with the predetermined digital computation.

21. (original) The semiconductor device according to Claim 18, wherein the first digital processing means performs a signal band limitation on a digital signal processed with the predetermined digital computation.

22. (original) The semiconductor device according to Claim 21, wherein the signal band limitation is pre-programmable.

23. (original) The semiconductor device according to Claim 18, wherein the second digital processing means performs a volume setting on a digital signal processed with the predetermined digital computation.

24. (original) The semiconductor device according to Claim 18, wherein the second digital processing means performs a signal band limitation on a digital signal processed with the predetermined digital computation.

25. (original) The semiconductor device according to Claim 21, wherein the signal band limitation is pre-programmable.

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26. (original) A mobile phone using a semiconductor device, comprising:
input means for converting a voice into an analog voice signal;

analog-to-digital voice converting means for converting the analog voice signal output from said input means into a first digital voice signal;

digital-to-analog voice converting means for converting a second digital voice signal sampled with a predetermined voice sampling frequency for voice signals into an analog voice signal;

voice output means for generating a voice sound in accordance with the analog voice signal output from said digital-to-analog voice converting means;

digital-to-analog audio converting means for converting a digital audio signal sampled with a predetermined audio sampling frequency for audio signals into an analog audio signal;
and

audio output means for generating an audio sound in accordance with the analog audio signal output from said digital-to-analog audio converting means,

wherein the semiconductor device is configured to process the first digital voice signal, the second digital voice signal sampled with the predetermined voice sampling frequency, and the digital audio signal sampled with the predetermined audio sampling frequency, and comprises:

first converting means for converting the digital audio signal into a signal sampled with the predetermined voice sampling frequency;

second converting means for converting the first digital voice signal into a signal sampled with the predetermined audio sampling frequency;

first digital processing means for performing a predetermined digital computation on the digital audio signal sampled with the predetermined voice sampling frequency and the second digital voice signal; and

second digital processing means for performing the predetermined digital computation on the first digital voice signal sampled with the predetermined audio sampling frequency and the digital audio signal sampled with the predetermined audio sampling frequency.

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27. (original) The mobile phone according to Claim 26, wherein the predetermined digital computation includes an addition, a subtraction, a rate setting of the addition, and a rate setting of the subtraction.

28. (original) The mobile phone according to Claim 26, wherein the first digital processing means performs a volume setting on a digital signal processed with the predetermined digital computation.

29. (original) The mobile phone according to Claim 26, wherein the first digital processing means performs a signal band limitation on a digital signal processed with the predetermined digital computation.

30. (original) The mobile phone according to Claim 29, wherein the signal band limitation is pre-programmable.

31. (original) The mobile phone according to Claim 26, wherein the second digital processing means performs a volume setting on a digital signal processed with the predetermined digital computation.

32. (original) The mobile phone according to Claim 26, wherein the second digital processing means performs a signal band limitation on a digital signal processed with the predetermined digital computation.

33. (original) The mobile phone according to Claim 32, wherein the signal band limitation is pre-programmable.

34. (original) A mobile phone using a semiconductor device, comprising:
input means for converting a voice into an analog voice signal;

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analog-to-digital voice converting means for converting the analog voice signal output from said input means into a first digital voice signal;

digital voice amplifying means for amplifying and outputting a second digital voice signal sampled with a predetermined voice sampling frequency for voice signals;

voice output means for generating a voice sound in accordance with the second digital voice signal output from said digital voice amplifying means;

digital audio amplifying means for amplifying and outputting a digital audio signal sampled with a predetermined audio sampling frequency for audio signals;

audio output means for generating an audio sound in accordance with the digital audio signal output from said digital audio amplifying means,

wherein the semiconductor device is configured to process the first digital voice signal, the second digital voice signal sampled with the predetermined voice sampling frequency, and the digital audio signal sampled with the predetermined audio sampling frequency, and comprises:

first converting means for converting the digital audio signal into a signal sampled with the predetermined voice sampling frequency;

second converting means for converting the first digital voice signal into a signal sampled with the predetermined audio sampling frequency;

first digital processing means for performing a predetermined digital computation on the digital audio signal sampled with the predetermined voice sampling frequency and the second digital voice signal; and

second digital processing means for performing the predetermined digital computation on the first digital voice signal sampled with the predetermined audio sampling frequency and the digital audio signal sampled with the predetermined audio sampling frequency.

35. (original) A method of providing a semiconductor device comprising the steps of:

first converting a first digital audio signal sampled with a predetermined audio sampling frequency for digital audio into a second digital audio signal sampled with a predetermined voice

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sampling frequency for voice signals;

second converting a first digital voice signal sampled with the predetermined voice sampling frequency into a second digital voice signal sampled with the predetermined audio sampling frequency;

first digital processing of the second digital audio signal sampled with the predetermined voice sampling frequency and a third digital voice signal with a predetermined digital computation; and

second digital processing of the second digital voice signal sampled with the predetermined audio sampling frequency and the first digital audio signal sampled with the predetermined audio sampling frequency with the predetermined digital computation.

36. (original) The method according to Claim 35, wherein the predetermined digital computation includes an addition, a subtraction, a rate setting of the addition, and a rate setting of the subtraction.

37. (original) The method according to Claim 35, wherein the first digital processing further comprises the step of setting volume to a digital signal processed with the predetermined digital computation.

38. (original) The method according to Claim 35, wherein the first digital processing further comprises the step of limiting a signal band of a digital signal processed with the predetermined digital computation.

39. (original) The method according to Claim 38, wherein the limiting step is pre-programmable.

40. (original) The method according to Claim 35, wherein the second digital processing further comprises the step of setting volume of a digital signal processed with the predetermined

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digital computation.

41. (original) The method according to Claim 35, wherein the second digital processing further comprises the step of limiting a signal band of a digital signal processed with the predetermined digital computation.

42. (original) The method according to Claim 41, wherein the limiting step is pre-programmable.

43. (original) A method of mobile telecommunication using a semiconductor device, comprising the steps of:

first converting a voice input into a first analog voice signal;

second converting the first analog voice signal output from said converting step into a first digital voice signal;

third converting a second digital voice signal sampled with a predetermined voice sampling frequency for voice signals into a second analog voice signal;

first generating a voice sound in accordance with the second analog voice signal output from said third converting step;

fourth converting a first digital audio signal sampled with a predetermined audio sampling frequency for audio signals into an analog audio signal; and

second generating an audio sound in accordance with the analog audio signal output from said fourth converting step,

wherein the semiconductor device is configured to process the first digital voice signal, the second digital voice signal sampled with the predetermined voice sampling frequency, and the first digital audio signal sampled with the predetermined audio sampling frequency, and comprises the steps of:

first converting the first digital audio signal into a second digital audio signal sampled with the predetermined voice sampling frequency;

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second converting the first digital voice signal into a signal sampled with the predetermined audio sampling frequency;

first digital processing of the second digital audio signal sampled with the predetermined voice sampling frequency and the second digital voice signal with a predetermined digital computation; and

second digital processing of the first digital voice signal sampled with the predetermined audio sampling frequency and the first digital audio signal sampled with the predetermined audio sampling frequency with the predetermined digital computation.

44. (original) The method according to Claim 43, wherein the predetermined digital computation includes an addition, a subtraction, a rate setting of the addition, and a rate setting of the subtraction.

45. (original) The method according to Claim 43, wherein the first digital processing step further comprises the step of setting a volume of a digital signal processed with the predetermined digital computation.

46. (original) The method according to Claim 43, wherein the first digital processing further comprises the step of limiting a signal band of a digital signal processed with the predetermined digital computation.

47. (original) The method according to Claim 46, wherein the limiting step is pre-programmable.

48. (original) The method according to Claim 43, wherein the second digital processing further comprises the step of setting a volume of a digital signal processed with the predetermined digital computation.

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49. (original) The method according to Claim 43, wherein the second digital processing further comprises the step of limiting a signal band of a digital signal processed with the predetermined digital computation.

50. (original) The method according to Claim 49, wherein the limiting step is pre-programmable.

51. (original) A method of mobile telecommunication using a semiconductor device, comprising the steps of:

first converting a voice input into an analog voice signal;

second converting the analog voice signal output from said converting step into a first digital voice signal;

first amplifying to output a second digital voice signal sampled with a predetermined voice sampling frequency for voice signals;

first generating a voice sound in accordance with the second digital voice signal output from said first amplifying step;

second amplifying to output a first digital audio signal sampled with a predetermined audio sampling frequency for audio signals;

second generating an audio sound in accordance with the first digital audio signal output from said second amplifying step,

wherein the semiconductor device is configured to process the first digital voice signal, the second digital voice signal sampled with the predetermined voice sampling frequency, and the first digital audio signal sampled with the predetermined audio sampling frequency, and comprising the steps of:

first converting the first digital audio signal into a second digital audio signal sampled with the predetermined voice sampling frequency;

second converting the first digital voice signal into a signal sampled with the predetermined audio sampling frequency;

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first digital processing of the second digital audio signal sampled with the predetermined voice sampling frequency and the second digital voice signal with a predetermined digital computation; and

second digital processing of the first digital voice signal sampled with the predetermined audio sampling frequency and the first digital audio signal sampled with the predetermined audio sampling frequency with the predetermined digital computation.